



AN ECONOMETRIC APPROACH TO THE IMPACT OF SHIPPING OPERATIONS ON NIGERIA'S ECONOMIC DEVELOPMENT

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ABSTRACT

The study took an econometric approach to study the impact of shipping activities on the economic development of Nigeria. Nigeria is blessed with an extensive body of waters which is yet to live up to its full potentials and one way to boost both economic growth and development is through shipping operations. The objectives of this research were to determine the relationship between shipping-related expenses and Nigeria's economic development, to discover the impact of the balance of international trade on economic development in Nigeria and to ascertain the effect of cargo throughput on Nigeria's economic development. Using an econometric approach with tools such as the Ordinary least squares and Pearson's correlation, the study found, among others that shipping expenses impact economic development negatively while cargo throughput has a positive impact on economic development. The study recommends that shipping expenses in Nigeria should be tailored in such a way that it would encourage more exports which would guarantee inflow of foreign exchange earnings.

KEYWORDS: Shipping, Maritime, Economic Development, Econometrics

1. INTRODUCTION

Shipping has provided opportunities for inland waterway transport, coastal and high sea trading and has also made it possible for Nigerians to develop skills for fish and shrimps trawling enterprise to name a few. Shipping can broadly be defined as the act of transporting commodities and products/items/shipment, through land, air, and sea. For this paper, we would focus on shipping as the movement of shipments from port A to port B, or from one country to another through the sea (Njoku et al., 2020). The maritime industry occupies a totally outstanding role in the financial system of countries everywhere in the world. The industry in its strict experience embraces all of the maritime associated business activities which take location within the country's maritime environment Adeleye et. al, (2015). These consist of offshore economic activities together with fishing, salvage, towage, underwater assets and on-shore economic activities together with port activities, maritime transport (shipping), ship construction, repairs and maintenance activities of a majority of these activities, transport could be the best raise to a nation's economic boom and development. This is so due to the fact all different maritime activities revolve around shipping. Due to close linkage among shipping activities and economic development, most international locations can not have enough money to deal with it with levity, as a result a conscious intervention had to make sure that the national interest is protected. (Obed, 2006). Shipping as a number one logistics issuer is vital in the Nigeria's international trade and economic development.

One major issue of concern in Nigeria's shipping industry is the difficulty of adequate policy formulation and implementation. Consequently, the contribution of shipping activities to economic development has been a topic of debate. In conventional maritime nations including United Kingdom, USA, Scandinavians and different European countries among others, the factors of time, power, planning, coordination and implementation of clear-cut polices through the appropriate maritime authority's intervention in large part account for the enviable levels of efficiency, sophistication and enormous fulfilment of their maritime activities especially in respect to the development of the



economy. Therefore, the simple questions that might agitate the thoughts of researchers include but not limited to the following: what are the reasons of developments in the shipping activities, what has been the trend and pattern of shipping or maritime activities in Nigeria, and what has been the impact of shipping activities on economic development in Nigeria Christiana and Matthew (2013).

The main objective of this paper is to determine the impact of shipping activities on the Nigeria's economic development while the specific objectives include:

- i. To determine the relationship between shipping-related expenses and Nigeria's economic development.
- ii. To discover the impact of the balance of international trade on economic development in Nigeria.
- iii. To ascertain the effect of cargo throughput on Nigeria's economic development.

2. LITERATURE REVIEW

This section will deal with the review of relevant theoretical and empirical literature that are related to this study. There are fewer studies that have directly linked the shipping sector to economic development thus in the review of literature done in this section, related studies will be reviewed.

New Trade Theory

This work adopted the New Trade Theory as its theoretical foundation, which was developed because of the constraints posed by the classical model. The new trade theory is hinged on growing returns to specialization that arises when an industry is confronted with excessive economies of scale. The new trade theories are used to provide an explanation for intra-industry trade, also called horizontal trade or two-way trade or cross-handling and is described as the simultaneous import and export of commodities belonging to the same industry. According to the theory, as the demand for a newly created product grows, the home country starts exporting it to different nations. Where when the demand grows, local production plants are opened to fulfil the request. This scenario covers the entire globe time to time, thus making that product a worldwide product (Hayek, 1960).

Empirical Literature

Christiana and Matthew (2013) in their study looked at the impact of the maritime transport sector on Nigeria's economic development. They used secondary data culled from the Central Bank of Nigeria (CBN)'s statistical bulletin. Using regression analysis, they found that the Nigerian maritime shipping sector has a positive and significant impact on economic development and industrialization in Nigeria, thus government should formulate policies that would encourage genuine foreign and private participations in the maritime sector of the economy.

Usman and Ibrahim (2010) investigated the impact of change in external reserve positions of Nigeria on domestic investment, inflation rate and exchange rate. Using a combination of ordinary least square (OLS) and vector error correction (VEC) methods, it was observed that change in external reserves in the country only influences foreign direct investment (FDI) and exchange rates and no influence of it was found on domestic investment and inflation rates. The results suggest that there is the need for broader reserve management strategies that will aim at maximizing the gains from oil export revenue by utilizing more of these resources to boost domestic investment. This research considered external reserve as a dependent variable over exchange rate and foreign direct investment. The study of Adeleye et. al, (2015) examines the impact of international trade on economic growth in Nigeria, using net export (i.e total export less total import) and Balance of Payment as proxies for international trade while Gross Domestic Product represent economic growth. The study employed regression analysis as the method of analysis using co-integration and error correction modelling techniques and found long-run positive impact by international trade on economic growth.

For Ijirshar et. al, (2016) their study examined the relationship between external debt and economic growth in Nigeria for the period of 1981-2014 using both descriptive and econometric tools. The regression results showed a significant relationship between external debt and economic growth in Nigeria. However, while external debt stock impacted positively, external debt service impacted negatively on the annual growth rate of the Nigerian economy both in the long run and the short run.



3. METHODOLOGY

This paper used causal research design to explain the impact between shipping activities and economic development in Nigeria. The dependent variable of this research is per capita income which is used as a proxy for economic development while the independent variables include shipping expenses, cargo throughput, balance of trade, and exchange rate spanning the periods between 1990 and 2020. Data were out sourced from reliable sources such as the CBN statistical bulletin and World Bank’s data page.

This research will use the specified model below:

$$PCI = f(SHIP, CTP, BOT, EXR) \dots\dots\dots (1)$$

The model is re-written in its econometric form as:

$$PCI = \beta_0 + \beta_1 SHIP + \beta_2 CTP + \beta_3 BOT + \beta_4 EXR + \mu_t \dots\dots\dots (2)$$

Where;

PCI is the Per Capita Income; β_0 is the constant; β_1 , β_2 , β_3 and β_4 are the coefficients;

SHIP is Shipping Expenses; EXR is Exchange Rate; CTP is Cargo Throughput;

BOT is Balance of Trade; While μ_t is the Stochastic Error Term.

The model will be estimated using the ordinary least squares regression technique while correlation, co-integration and model diagnostic tools would also be utilized.

4. RESULTS AND DISCUSSION OF FINDINGS

In this section, both statistical tests and model estimation will be carried out. We begin by considering the correlation matrix below.

Table 4.1: Pearson’s Correlation Matrix

| Correlation | | PCI | SHIP | CTP | BOT | EXR |
|-------------|--|---------------------|---------------------|---------------------|---------------------|-------------------|
| Probability | | | | | | |
| PCI | | 1.000000 ----- | | | | |
| SHIP | | -0.128490 0.0616 | 1.000000 ----- | | | |
| CTP | | 0.875886 0.0000 | 0.179578 0.5390 | 1.000000 ----- | | |
| BOT | | -0.226836 0.4355 | 0.485525 0.0784 | -0.178310 0.5419 | 1.000000 ----- | |
| EXR | | 0.392121 0.0655 | -0.879088 0.0000 | 0.156622 0.5929 | -0.568361 0.0340 | 1.000000 ----- |

Source: Author’s Computation using E-views 12

From the above table 4.2.2, there is a negative linear relationship between per capita income and shipping expenses and the value of the correlation is -0.128490, the strongest positive correlation value in the table is between cargo throughput and per capita income with a correlation coefficient of 0.875886.

The weakest positive correlation is that between exchange rate and cargo throughput with a value of 0.156622.

The strongest negative correlation is between exchange rate and shipping expenses with a value of -0.879088, while the weakest negative correlation is between per capita income and shipping expenses with a value of -0.128490. This brings the study to test for long run equilibrium using the Johansen co-integration test results as seen in the table below.

**Table 4.2 Johansen Co-integration**

| No. of co-integrating equation | Trace Statistic | | Maximum Eigen Value | |
|--------------------------------|-----------------|-----------|---------------------|-----------|
| | Trace Statistic | P-Value** | Max-EigenStatistic | P-Value** |
| None * | 129.0532* | 0.0000 | 57.98225* | 0.0000 |
| At most 1 * | 71.07091* | 0.0001 | 40.28437* | 0.0007 |
| At most 2 | 30.78654* | 0.0383 | 16.53851 | 0.1949 |
| At most 3 | 14.24803 | 0.0764 | 13.25995 | 0.0716 |
| At most 4 | 0.988076 | 0.3202 | 0.988076 | 0.3202 |

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Computation using E-views 12

The Trace and Maximum Eigen value tests produced the same result in that they both rejected the Johansen co-integration null hypothesis that there is no co-integrating relationship between the variables, however, while the Trace test indicates at most two co-integrating equations, the Max-Eigen tests indicate there is one co-integrating equation at 5% significance level. The exact identifying estimates of the Johansen Maximum likelihood estimates show the co-integrating coefficients normalized to real gross domestic product, and is shown in the table below. This will aid in understanding the long run relationships between the variables.

Table 4.3 Normalized Co-Integrating Coefficients

| Variables | PCI | SHIP | CTP | BOT | EXR |
|----------------|----------|-----------|-----------|-----------|-----------|
| Coefficients | 1.000000 | -0.178784 | -0.005081 | 0.000135 | 2.694398 |
| Standard Error | | (0.0209) | (0.00061) | (0.00003) | (0.50664) |
| t-statistics | | -8.538 | -8.330 | 4.500 | 5.318 |

Source: Author's Computation

From the above table, it can be seen that shipping expenses, cargo throughput, balance of trade and exchange rate all exert statistically significant impacts on per capita income in the long run. Shipping expenses and cargo throughput have a negative long-run impact on per-capita income while balance of trade and exchange rate exert positive impacts on per capita income in the long run.

Having established long run relationship between the independent variables on the per capita income, the ordinary least squares (OLS) will be estimated to help determine the nature of short-run impacts. The OLS estimates are presented in table 4.4 below:

Table 4.4 OLS Estimation

| Variable | Dependent Variable: PCI | | | |
|--------------------|-------------------------|-----------------------|-------------|----------|
| | Coefficient | Std. Error | t-Statistic | Prob. |
| C | -3072.417 | 773.3151 | -3.973047 | 0.0032 |
| SHIP | -0.397014 | 0.144435 | -2.748738 | 0.0087 |
| CTP | 7.37E-05 | 1.29E-05 | 5.715174 | 0.0003 |
| BOT | 1.62E-05 | 2.15E-05 | 0.755016 | 0.4695 |
| EXR | -0.366815 | 2.468770 | -0.148582 | 0.8852 |
| R-squared | 0.861674 | Mean dependent var | | 1860.017 |
| Adjusted R-squared | 0.800196 | S.D. dependent var | | 562.6055 |
| S.E. of regression | 251.4813 | Akaike info criterion | | 14.16507 |
| Sum squared resid | 569185.6 | Schwarz criterion | | 14.39330 |
| Log likelihood | -94.15547 | Hannan-Quinn criter. | | 14.14394 |
| F-statistic | 14.01597 | Durbin-Watson stat | | 1.557701 |
| Prob(F-statistic) | 0.000664 | | | |

Source: Author's Computation using E-views 12



From the result, it can be seen that shipping expenses has a negative impact on per capita income as a unit increase in shipping expenses will lead to a 0.397014-unit decrease in per capita income.

There is a positive impact on per capita income by cargo throughput as a million units increase in cargo throughput causes per capita income to rise by 0.737 unit.

Likewise, balance of trade impacts per capita income positively as one million units increase in balance of trade causes per capita income to increase by 0.162 unit.

There is however a negative impact by exchange rate on per capita income as a unit increase in exchange rate will cause per capita income to fall by 0.366815 unit.

The intercept value of -3072.417 implies that without all the independent variables used in this model or if they are held constant, then per capita income will have a negative value of -3072.417.

The test of individual significance of each of the independent variables was done using the t-test and their respective p-values. The t-ratios reveal that the coefficients of the intercept, shipping expenses and cargo throughput are statistically significant while the coefficients of balance of trade and exchange rate are not statistically significant. The model has high explanatory and predictive powers as suggested by the R-squared and the adjusted R-squared values respectively. The R-squared value of 0.861674 suggests that about 86.2% of the systematic variations in per capita income can be explained by shipping expenses, cargo throughput, balance of trade and exchange rate, while the remaining 13.8% are taken care of by the stochastic error term. The adjusted r-squared value of 80% shows that the model's predictive power is very good. The goodness-of-fit model is further emphasized by the statistical significance of the F-statistics which is 14.01597 with a p-value of 0.000664, this means that all the explanatory variables taken together are significant.

The Durbin-Watson statistic of 1.557701 according to econometric theory suggests that there could be presence or absence of autocorrelation as the statistic falls within the grey region or region of indecision (Gujarati, 2004). Further tests of autocorrelation will then be done using the Breusch-Godfrey Serial Correlation LM Test.

Table 4.5 Breusch-Godfrey Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---------------|----------|---------------------|--------|
| F-statistic | 0.196665 | Prob. F(2,7) | 0.8259 |
| Obs*R-squared | 0.744810 | Prob. Chi-Square(2) | 0.6891 |

Source: Author's computation using E-views 12

The Breusch-Godfrey test of serial correlation is based on the null hypothesis that the residuals are not serially correlated. From the above result, it can be seen that the p-value of the F-statistic is 82.59% which is very well above the 5% level of significance, thus we cannot reject the Breusch-Godfrey test null hypothesis which states that "there is no serial correlation". This further affirms the absence of serial correlation.

5. RECOMMENDATIONS, CONCLUSION AND AREAS FOR FURTHER RESEARCH

This study has considered the impact of shipping activities on Nigeria's economic development. Shipping is an indispensable livewire in any economy and this study has shown that when resources are well managed and channelled to the right sources, shipping has the potential to impact, not just economic growth but also economic development in the long-run.

In the case of Nigeria however, certain challenges must be addressed such as shipping-related expenses and international trade should be managed in such a way that the economy should not be heavily import-dependent but the industrial sector should be improved over and over again to ensure the diversification of the nation's exports.



Finally, the relevant authorities should ensure adequate laws and policies that would create a favorable environment for the Nigerian maritime sector.

Recommendations

In light of the findings of this research, the following recommendations are proffered:

- i. The shipping expenses in Nigeria should be tailored in such a way that it would encourage more exports which would guarantee inflow of foreign exchange earnings.
- ii. The industrial sector should be revived and invested heavily in so as to reduce the significant import-dependency of the citizens.
- iii. Capital goods should dominate imports instead of consumer goods.
- iv. The small and medium scale enterprises in Nigeria should be empowered by government so that they can begin to export their goods and services.
- v. The ease of doing business can be improved upon by favourable policies which would drive foreign direct investment into the economy.

Areas for Further Research

Having seen the impact of shipping activities on economic development in Nigeria, there are other areas not captured by this study and is thus recommended as further research areas for future researchers. These include but not limited to: There are other indicators for economic development, and while this study used per capita income to proxy economic development, future researchers can use other relevant economic development indicators to carry out their research. Also, future researchers should also consider using a systems approach to their analysis such as the Vector Auto Regression (VAR) approach. The essence of this is to see the interrelatedness of all the variables and how they impact each other at the same time.

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